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Predicting Fatigue Life of Metal Bellows

Structural fatigue due to cyclic stressing is the most common mode of failure for metal bellows expansion joints used in ducting. Fatigue failures usually take the form of circumferential cracks in the roots or crowns of the convolutions. A method was required for predicting the fatigue life of bellows from design parameters.

The classical method of presenting fatigue data in plots of alternating stress vs number of deflection cycles (commonly called S-N curves) has been applied to bellows formed of various metals, including corrosion-resistant steel, nickel alloys, and aluminum alloys. With these data, the expected life of a new bellows design can be determined with reasonable accuracy before the bellows is fabricated and tested.

Note:

Technical details may be obtained from:
Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
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No patent action is contemplated by NASA.

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